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Skeletal Measurements and Observa-  
tions on the Point Barrow Eskimo  
with Comparisons from other  
Eskimo Groups

BY  
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THESIS PRESENTED TO THE FACULTY OF THE GRADUATE  
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## SKELETAL MEASUREMENTS AND OBSERVATIONS OF THE POINT BARROW ESKIMO WITH COMPARI- SONS WITH OTHER ESKIMO GROUPS

By ERNEST WILLIAM HAWKES

### PREFACE

FOR the past six years the author has made an intensive study of that very interesting people, the Eskimo. Between three and four years of this time have been spent in work among them, in Bering strait and on the Yukon river in Alaska, and in Labrador and Hudson bay in the east. Although the author has been principally interested in the ingenious culture of these masters of environment, the opportunity for physical observation has not been neglected. Consequently, when an opportunity offered for filling in a gap in the physical anthropology of the Eskimo, through the presence of a very complete and fair-sized skeletal collection from Point Barrow, Alaska, in the Wistar Institute of Anatomy in Philadelphia, which had been left untouched since its collection in 1898, the author was very glad to supplement his information on this subject.

A year was spent on the material with the following results. The collection was measured and its general characteristics outlined and comparisons instituted with other Eskimo tribes. Later, the comparison may be extended to include the Indians bordering on the Eskimo.

The author wishes to thank the University of Pennsylvania for its cordial support in this work, and the Director of the Wistar Institute of Anatomy for generous accommodations during the pursuit of the same. He also wishes to acknowledge his indebtedness to Mr. Ralph Linton for the measurements of the long bones, and much helpful assistance in the completion of the work.

## INTRODUCTION

The Eskimo present the unique spectacle of a people extending for five thousand miles across the entire northern border of a continent, living under the same climatic environment, and practically homogeneous throughout in customs and speech. Consequently, they offer a problem which is not only sectional but general, and any light which may be thrown upon their development, particularly the physical side, is of interest in connection with the general problem of the relation of man to his environment. Although the present investigation has been limited to local and racial comparisons, the peculiar situation of the Eskimo may make the results suggestive of the larger problem.

In the following pages we have concerned ourselves chiefly with the description of skeletal material from a hitherto little-studied branch of this people, the Alaskan Eskimo. The collection includes twenty-eight crania, male, female, adolescent, and infantile, and three skeletons, brought down from Point Barrow, at the extreme northern point of Alaska, in 1898 by E. A. McIlhenny. The Point Barrow Eskimo, as will be remembered from Murdoch's<sup>1</sup> report, possess the simple Arctic culture characteristic of the more isolated tribes of the central and eastern Eskimo, and are as yet uninfluenced by an intermixture of Indian customs and mythology, as is the case with the more southerly Alaskan Eskimo tribes. Their isolation has also preserved the purity of their physical type. The only possibilities of intermixture are with the Athapascan tribes of the interior, who are very rarely met with on spring hunting trips into the interior, and from whom they are separated by inland Eskimo tribes, and with the white whalers, whose influence, as Stefánsson has shown, has been of such short duration that it has not affected the native type. Furthermore, they are separated from the Mackenzie river Eskimo, the next division to the east, by some two hundred miles of uninhabited coast line, and only come in contact with them at infrequent intervals for trade at Barter island, or on whaling trips.

<sup>1</sup> John Murdoch, "Ethnological Results of the Point Barrow Expedition" (*Ninth Annual Report Bureau of Ethnology*, pp. 1-441. Washington, 1892).



Thus, the Point Barrow Eskimo have not been subject to Athapascan influence, like the interior Alaskan tribes, nor to the mixture of Northwest Coast and Russian customs present on the Yukon, nor directly to the strong Siberian influence in Bering strait. Consequently, they offer distinct advantages as a pure Alaskan group.

For purposes of comparison the Southampton island Eskimo have been accepted as typical of the central group. Their situation precludes any possibility of Indian contact and they very rarely met even other Eskimo tribes. Furthermore, we have an excellent intensive physical study of these people by Dr. Hrdlička,<sup>1</sup> which is a great aid in comparison. In our comparative tables we have followed the accepted routes of Eskimo migration, which appear to reveal certain well-defined tendencies in physical type as well as culture.

The Eskimo are particularly valuable as offering a fairly constant racial type for comparison with widely different Indian tribes throughout their extent. Their physical influence on two Indian stocks as different as the Athapascan and Algonkian is fully as significant as their cultural influences. Dr. Boas has suggested the strength of this influence in the east.<sup>2</sup>

On the other hand, it would appear from our investigation that the influence of the Indian on the Eskimo type in Alaska, at least in the northern section, has been overestimated. In the crania available we find that the majority of Alaskan Eskimo approximate the central type, and in individuals the racial characteristics, as the broad face, narrow nose, etc., are as strongly developed as in that area. Possibly the superior stature of the western group may be as much due to better food, clothing, and housing conditions as to an intermixture with Indian tribes, an assumption which has not yet been proven.

Particular attention has been given in this investigation to sexual differences which were found to be considerable. We find

<sup>1</sup> "Contribution to the Anthropology of the Central and Smith Sound Eskimo" (*Anthropological Papers of the American Museum of Natural History*, Vol. V., part 1).

<sup>2</sup> Franz Boas, "Physical Types of the Indians of Canada." (*Annual Archaeological Report*, p. 88. Ontario, 1905.)

that the exaggerated features, such as breadth of face as compared with breadth of head, on which particular stress has been laid, are not expressed in the female, but are a characteristic of the male, not only in the Alaskan but in the other Eskimo groups. The general tendency is for the male to reproduce the racial type in an exaggerated form. Consequently, owing to the scarcity of female measurements, or the ignoring of sexual differences, as in Bessels' work,<sup>1</sup> a set characteristic has been accepted as a racial trait.

In dealing with the mandible we have followed the illuminating suggestions of Thompson and worked out the indices which indicate the leverage of the jaw. The theory of the comparative shallowness of the glenoid fossa in the Eskimo being the result of the rotary motion of the mandible and the food used by them, as embodied in the recent study by Knowles,<sup>2</sup> has also been considered for this group. It was generally found to hold good and is being worked out in detail for later publication.

The crania offered examples of infantile, adolescent, and adult forms of dentition, for which both dental and cusp formulæ have been worked out. It was found that certain primitive characteristics, such as the additional cusp of the third molar, and the meeting of the incisors edge to edge, were present in this group.

The skeletal proportions are somewhat larger than those given by Hrdlička for the Smith sound Eskimo, but the form is as typical. Certain very primitive characteristics, such as the perforation of the olecranon fossa and the extreme forward curve of the femur, were noted in the female skeleton.

#### INCREASE IN STATURE AMONG THE WESTERN ESKIMO

The Alaskan Eskimo are a taller and more symmetrical people than their brethren of the central and eastern districts. They lack that appearance of stoutness and squatness inherent in the eastern stock, and for proportion and development of the various parts of the body they do not compare unfavorably with Indians

<sup>1</sup> Bessels, Emil. "Einige Worte über die Inuit (Eskimo) des Smith Sundes, nebst Bemerkungen über Inuit Schädel" (*Archiv f. Anthropologie*, VIII., 1875).

<sup>2</sup> Knowles, F. H. S. "The Glenoid Fossa in the Skull of the Eskimo." (*Canadian Geological Survey, Museum Bulletin*, No. 9.)

and whites. It is not unusual to find in an Alaskan Eskimo village several men who are six feet tall, with magnificent shoulders and arms and bodily strength in proportion. The usual height however is about 168 centimeters for men, which is some 10 cm. above the height of the eastern Eskimo. The Central Eskimo (Southampton islanders), according to Hrdlička, average about 162 cm. in height. The average for women among the western Eskimo is 158 cm., which approximates the height of the men in the Hudson bay region (158 cm., Boas). The female type in Alaska is taller and slimmer than in the east, and the width of the face is considerably less. Eskimo women of large stature are often seen in the northern section of Alaska. The individual variation here is more conspicuous than in Labrador or Hudson bay.

Whether these changes in physical type in the west are due to changed conditions or to intermixture with Indian or Asiatic tribes is an open question. The conditions of life of the Eskimo in the west are appreciably different. They occupy permanent villages of comfortable stone and wood iglus, as opposed to the shifting winter snowhouse and summer tent of the eastern group. For hunting game on the water, the Western Eskimo has for the most part abandoned the kayak for the larger and roomier umiak while most of the hunting on the sea ice and land is done on foot instead of with the dog sledge. Long distance foot races form one of their winter sports, and the boast of the old hunters is that they were able in their prime to run down a reindeer after an all day chase through deep snow. Consequently, we find the lower limbs much better developed here than we do further east. This may account in part for the increase in stature in the west.

The rest of the body, as well as the long limbs, has developed into larger proportions in the west. Better food and clothing, as well as better housing, may have assisted here. To one who has seen both regions, as the author has been privileged to do, there can be no question as to the superior environment of the Western Eskimo. One coming from Alaska to Labrador and Hudson bay is struck with the poverty of life in the eastern district, the hazardous food supply, and the scantiness of the material culture.

The walrus, still abundant in Alaskan waters, have largely forsaken the eastern coast. Whales are more frequent in Arctic Alaska, although rapidly growing less, than in Hudson bay as the number of whaling ships might testify. There is no such tremendous competition by white sealers and fishers in the west as obtains on the Labrador coast. Although the eastern region has the advantage in wild reindeer, the Alaskan Eskimo has drawn on the tame herds of his cousin, the Chukchi, since early times, for warm clothing, and now, thanks to the American government, has herds of his own. The general outlook of the Eskimo in the west appears more favorable, and his condition an improvement over the old home region of Hudson bay. Consequently, we might expect increased stature without taking into account a possible intermixture with the Indians of the west, which is difficult of proof.

The author does not see why the possibilities of intermixture with Indian tribes are any greater in the west than the east. So far as we know, the Eskimo have been in contact with the Indians in the east as long as in the west. In both regions there has been constant warfare and a deep-seated and ancient racial antipathy. No cases of intermixture have been recorded, although there is a bare possibility of an intermixture previous to historical times. It is true that the Alaskan Eskimo, from the Yukon south, have borrowed much of Indian customs and mythology, but even here the racial type is well preserved and the boundary sharply marked. The northern Alaskan Eskimo have more intercourse with Siberia through the Diomede islands than with the interior Athapascan. A very ancient trade has been followed by a considerable intermixture of blood in the Bering strait region. The inhabitants of the Diomedes take their descent in about equal proportions from the American and Asiatic sides of the strait. Those Eskimo who have penetrated to the Asiatic side (the Asiatic Eskimo) are now bi-lingual and have adopted the dress and habitations of the Chukchi. The amalgamation of these peoples is now nearly complete, the Eskimo only occupying a few remaining villages on the Siberian shore. Long before the advent of the white man in these parts, they made visits in company to the American side, first hostile, and

later in the way of trade. Kotzebue sound was the ancient trading place, where the tribes gathered in summer in large numbers from both sides of the strait. It is in this section that we find the increase in stature most pronounced, rather than on the Yukon or in the extreme south. Consequently, we must take into account the possibility of intermixture from Siberia as well as from the interior of Alaska, in considering the changes in physical type of the Eskimo in the west. However, it must be remembered that these changes have not been sufficient as yet to overcome the main features of the original type.

#### THE ACTION OF THE TEMPORAL MUSCLES ON THE SHAPE OF THE SKULL

In the adult male crania of this series the temporal crest is well marked and very high (see pl. IX). It does not appear so prominently in the female skulls and hardly at all in the infantile and adolescent series. The extensive plane covered by the temporal muscle on the adult skull would indicate a very strong development of the same.

Arthur Thompson, in his paper on *Man's Cranial Form*, has worked out the possible effects of the lateral pressure exerted by the temporal muscles on the skull. This was done by exerting pressure by means of fibers of silk on the temporal plane of an artificial skull inflated with air, which resulted in a compensatory increase in the height and length of the skull. The experiment suggested that the action of the temporal muscles on the Eskimo skull was similar.

Hrdlička later showed that the effect of the temporal muscles on the infantile skull was slight, and, as the articulations became more firm, the increased resistance would offset the pressure of the muscles. He suggested that the temporal muscles act as confining pads, and that the growing skull, conforming to the line of least resistance, enlarges in the other two main directions, namely, height and length.

The pressure of the temporal muscles is proportional to the amount of their use. Consequently, we should expect to find the female skull much more scaphoid than the male, as the Eskimo

women are almost constantly engaged in chewing boot soles and skins outside of the regular exercise the muscles would get in eating. But the contrary is true. The female skull is broader and less scaphoid than the male, and the temporal surfaces less marked. The cephalic index of the female skulls is 76.06 in our series, as contrasted with the purely dolichocephalic skulls of the males, which average 72.65. The adolescent and infantile crania also tend toward mesocephaly, with average cephalic indices of 75.26 and 77.68 respectively. The term mesaticephalic, then, fits the appearance of the female and young skulls more accurately. The dolichocephalic character of the head would appear to be attained in growth. In the more scaphoid type of the male skull perhaps we have another evidence of the adult male producing the racial characteristics in an exaggerated form.

#### SEX DIFFERENCES

The importance of the sex variation in the Eskimo is considerable, and appears to have been overlooked by most investigators. Duckworth and Pain, in their valuable correlation of Eskimo head and skull measurements, were careful to make this distinction. The main variation in the Point Barrow skulls, outside of the more scaphoid appearance of the male skull already mentioned, is in the relation of the breadth of face to the width of the head. In nearly every case it is under 100 in the females and over 100 in the males, the breadth of face being excessive in the males but less than the width of head usually in the females. Both the facial and frontal width approximate the maximum breadth of the skull more closely in the female than in the male. The cephalic and altitudinal indices are higher in the female, although the capacity is considerably less. The facial and nasal indices agree fairly well in both sexes. The palatal (external) index of the female is higher than that of the male, and the palate broader, due to the extensive use mentioned above. The alveolar prognathism of the two sexes is practically the same (97.53 being the alveolar index for males, and 97.198 for females). The adult condition does not seem to differ greatly from that of the adolescent (alveolar index 97.706). (See Table A.)

The mandible of the male is heavier and larger absolutely, but not proportionally. The general development and lines in both sexes is similar. The coronoid index, which indicates the leverage of the jaw (as formulated by Thompson), is remarkably uniform in

TABLE A  
ESKIMO CRANIA FROM POINT BARROW, ALASKA  
*Measurements as to Form; Prognathism*

Cat. No.	Sex	Bas. Pro.	Bas. Nas.	Alv. Index
5400	male	104	104	100.00
5401	"	111	106	95.50
5403	"	97	101	96.04
5406	"	105	108	97.22
5408	"	105	108	97.22
5409	"	96	102	94.12
5410	"	98	106	92.45
5411	"	107	108	99.07
5414	"	113	116	97.41
5415	"	105	105	100.00
5418	"	109	107	101.87
5423	"	107	107	100.00
5425	"	104	102	101.96
5426	"	100	108	92.59
Averages	....	104.3	106.2	97.53
5402	fem.	99	102	97.06
5405	"	97	98	98.98
5416	"	95	101	94.06
5420	"	97	98	98.98
5428	"	94	97	96.91
Averages	....	96.4	99.2	97.198
5404	adol.	94	96	97.92
5407	"	89	93	95.70
5413	"	86	90	95.56
5417	"	99	102	97.06
5421	"	92	92	100.00
5424	"	96	96	100.00
Averages	....	92.6	98.1	97.706
5412	inf.	78	85	91.76
5422	"	80	83	96.39
Averages	....	79	84	94.075

male and female (39.75 for males and 39.19 for females). The mandibular index is greater in the male (100.15 for males and 90.478 for females). This is due to the female mandible being rela-

tively shorter and broader than the male, probably due to the more extensive rotary use of the same. The male mandible is approximately as long (condylosymphisial length) as it is wide (bi-condylar width.) The gripping and grinding powers of the jaws in both sexes is tremendous. The Eskimo workman uniformly uses his teeth to reinforce his hands in tightening lashings or undoing knots of frozen sealskin. The constant chewing by the women soon wears their teeth to a common level. The inclination of wear is slightly oblique, and pronouncedly so in the men, the outer edge of the teeth being worn on the lower jaw and conversely above (see pl. XIV). In both sexes there is a strengthening of the alveolar process at the molars to withstand the heavy strain put upon them. The molars themselves often show an extra cusp, and sometimes an accessory one, while the third molar in many cases has a foliated appearance, giving additional small cusps.

The bones of the incomplete female skeleton were found to be much more primitive than those of the two male skeletons. The olecranon fossa were perforated, and there was an excessive forward curve of the femur which was absent in both male skeletons. The exostoses for the attachment of muscles were also more pronounced in the female skeleton. Generally speaking, the female skeleton strikes one as more primitive and less differentiated, and the male as more specialized toward a racial type.

#### THE FORM OF THE PELVIS

The female pelvis in the Eskimo is chiefly remarkable for its large dimensions. A specimen from Davis strait measured by Turner gave the following results:—

	Conjugate	Transverse	Oblique
Brim.....	4 5/8 in.	6 in.	5 6/8 in.
Cavity.....	5 5/8 "	5 2/8 "	5 4/8 "
Outlet.....	5 2/8 "	5 1/8 "	5 4/8 "
Circumference of Brim.....			16 1/2 in.
Depth of Pelvis.....			4 "
Index of Brim.....			76 "

The female pelvis in the present series was incomplete, only one innominate bone remaining. The dimensions of the same were,—



height 205 mm., breadth 150 mm., index 73.13. The measurements of the male pelvis were as follows,—max. breadth (external) 299 mm., general pelvic index 78.92, ant. post. diameter 106 mm., lateral diameter (internal) 132 mm., pelvic index at superior strait 80.30.

It will be seen from the above dimensions that in the Eskimo as in other races, the male pelvis is larger in the brim but smaller in the outlet than the female pelvis. The dimensions of the outlet appear to be unusually large in the female pelvis, which accounts for the swift and easy parturition of the Eskimo women reported. There is a general custom among the Alaskan Eskimo of expelling the infant by pressing on the abdomen. This operation is performed by certain old women, who act as midwives for the village. A stout sealskin thong is drawn tightly around the waist of the patient, the position of the child located, and pressure exerted downward by the operator, who stands behind the patient with hands locked over the abdomen. The patient kneels on the floor, in which position she is delivered in a short time. The operation is not usually commenced until labor is well under way.

#### OCURRENCE OF AN EXTRA VERTEBRA IN THE ESKIMO

In the complete male skeleton (5864) thirteen dorsal vertebræ were found instead of the normal twelve. The eleventh, twelfth and thirteenth vertebræ closely approximated in form the normal tenth, eleventh, and twelfth. The thirteenth vertebra was of normal size and thickness, with well-developed lateral facets for the attachment of ribs. The thirteenth rib was present on both sides, being rather smaller than the normal twelfth rib, but still well developed. The twelfth rib, on the other hand, was much longer than in normal individuals, and showed signs of cartilaginous attachment at the tips.

The incomplete skeleton (5429) also gave evidence from the articulation of the presence of an additional vertebra between the twelfth dorsal and first lumbar vertebra. Turner in the *Challenger Reports* also mentions the occurrence of a supernumerary vertebra in this position in the case of two Australians and an Eskimo female skeleton examined by him. More recently Charles Dawson has

drawn attention to the frequency of extra vertebræ in the Eskimo. He treats it as a racial characteristic acquired through the continual balancing necessary in handling a kayak.

The wonderfully light construction of this little craft, made of driftwood and skins, without keel or ballast, requires continual tension to keep it from capsizing. Under these circumstances, it is an advantage to have a flexible back and long waist, and the individual possessing these characteristics has a better chance of survival. When the kayak is overturned, he is able to right himself by a powerful twist of the body and stroke of the paddle. This trait, transmitted and become general through the survival of the fittest, would in time become a racial characteristic. Another factor making for a flexible waist is the backward bend of the hunter in poising the harpoon when in the kayak, and the continual twist of the body in using the double-bladed paddle on either side alternately.<sup>1</sup>

The additional vertebra is a simian characteristic and occurs in very primitive races. It is another evidence of the primitive structure of the Eskimo skeleton, in keeping with other anomalies discovered in this series as the perforation of the olecranon fossa, the extreme forward curve of the femur, etc.

The lumbar curve in the Eskimo is, however, not in keeping with the primitive traits above mentioned, the index (after Cunningham) being intermediate between that of the European and those of the primitive peoples. The index for the Eskimo is 99.7, as opposed to 95.8 for the European and 107.8 for Australians, 106.6 for Bushmen, and 105.4 for negroes. The lumbovertebral index of 5864, in which the thirteenth dorsal vertebra was present, is 99.6, thus differing by only .1 from that given by Cunningham as the Eskimo normal. This apparently inconsistent characteristic of a supernumerary vertebra, in conjunction with a well-developed curve, may be accounted for by the exercise of the waist mentioned above, which demands a high degree of suppleness and elasticity conducive to

<sup>1</sup> The author does not wish to insist upon this possible explanation. In a large series of Eskimo skeletons from St. Lawrence island examined by a friend since this article was written, an extra vertebra was found in only two. So that it would appear to be a not uncommon anomaly among the Eskimo, rather than a racial trait.

the formation of compensatory vertebral curves. It is noteworthy that the Alaskan Eskimo, who do not use the kayak with the same expertness as the Greenlanders, from whom Dawson drew his material, nevertheless retain this racial characteristic of a well-marked curve.<sup>1</sup>

#### OCCURRENCE OF OTHER ANOMALIES

Although the Eskimo skull is scaphoid in shape, the sagittal suture remains open to an advanced age, in contradiction to the early closure of crania of this shape in other races, due to lateral pressure. In only three of the twenty-eight Point Barrow skulls is there a complete fusion of the parietals. One of these is a male, and the other a female, both aged. The other case, curiously enough, is that of an adolescent skull. The sagittal suture is completely closed although the other sutures are well marked and dentition is incomplete. The shape of the adolescent skull is rounded rather than scaphoid. The female skulls are less scaphocephalic than the male.

In several of the skulls of both sexes the metopic suture is not yet closed in the region of the glabella. The infra-orbital suture persists in a majority of cases. There are ten cases of the appearance of Wormian bones in the occipital region, and one skull (5428) shows the rare Epiteric bone. A search for evidence of grooves formed by the supra-orbital nerves in the frontal region and blood vessels in the occipital,<sup>2</sup> which are said to be rare in the Eskimo, failed to reveal anything in this series.

The incisors, in the young as well as in the adults, meet edge to edge, instead of overlapping as in most races. The canines also meet instead of falling one behind the other and are worn down to a level with the incisors. They are much thickened and approach the pre-molar in shape. The position and wear of the front teeth sug-

<sup>1</sup> Cunningham, Lumbar Curve in Man and the Apes. *Cunningham Memoirs, Royal Irish Academy*, 1886.

<sup>2</sup> "On Certain Markings, Due to Nerves and Blood Vessels, Upon the Cranial Vault; Their Significance and the Relative Frequency of their Occurrence in the Different Races of Mankind," A. Francis Dixon, *Journal of Anatomy and Physiology*, Vol. 38, 1904.

gests a side-to-side grinding movement of the jaw in the Eskimo as in Mousterian man, as opposed to the direct bite of civilized man. The extremely broad palate of the Eskimo is further evidence of this movement. Consequently, the teeth are worn off obliquely the inclination being inward on the upper jaw and outward on the lower.

In one aged male skull (5403) the atlas is fused with the base of the skull, resulting in an obscuring of the outlines of the foramen magnum, which appears distorted. In another male skull (5404) the foramen magnum is decidedly asymmetrical. In 5408, owing to a diseased condition of the bone (plate XIV), the entire base of the skull is twisted out of shape. The pyriform shape of the foramen magnum was not noted in any of the crania.

#### INFANTILE AND ADULT CHARACTERISTICS

Duckworth and Pain, in "A Contribution to Eskimo Craniology," have outlined those characteristics of Eskimo crania which they attribute to growth, and those which they believe are retentions of infantile traits. The present series has been carefully gone over with this in mind. Of the infantile characteristics retained in the adult the following held good: the megasemic orbital aperture, the flattened nasal skeleton, the small mastoid processes, and the persistence of the infra-orbital suture. For the rest, the pyriform contour of the foramen magnum was not present in either the young or adults, the prominence of the chin was more apparent than real, and the most important infantile trait suggested, the dolichocephalic character of the skull, was not borne out by our results at all. Both the infantile skulls in our series are mesocephalic (indices 78.85 and 75.5), as are the three "young" skulls from Southampton island described by Hrdlička, with cephalic indices of 78.1, 77, and 76.1 respectively. We would therefore be inclined to place the dolichocephalic character of the adult Eskimo head under those characteristics acquired by growth. To this we would add the other traits suggested by Duckworth and Pain under this head; the low nasal index, depending on the extreme narrowness of the nasal aperture (which Hrdlička suggests may be an adaptation

to extreme cold); the greater prominence of the malar bones, and the scaphocephalic cranium without sagittal synostosis. Of these the difference in nasal width is not great proportionally between young and adult skulls, and the scaphocephalic cranium is much more frequent in the males.

#### INDIVIDUAL VARIATION

The accompanying table of the variation of the indices of individuals within the three great Eskimo branches (see Table B), eastern, central, and western, was suggested by a table of the individual variation in the indices of a set of Labrador and Greenland skulls examined by Duckworth and Pain. It appeared feasible to extend this treatment to other Eskimo groups and denote the individual variation within each group and as compared with each other. The number of crania in the different groups is not exactly the same, but sufficiently close for general conclusions. For the central group the adult skulls of Hrdlička's Southampton islanders have been taken, and for the western, the adult crania in the present series. Hence, we have small but representative groups for comparison.

In those indices which determine the racial affinity of Eskimo tribes, the cephalic, vertical, nasal, and orbital, the average indices of all three groups are very close. Consequently, when we find the traits which the indices reveal, a dolichocephalic head, megasemic orbits, and leptorhinian nasal structure persisting throughout these groups, we may safely conclude that the racial relation is strong, and that the variations of tribe and tribe are less than the individual ones. We might further expect that the individual variation would be greatest in that branch which has been subjected to the additional stimulation afforded by an improved environment and contact with races of a superior type and culture. Consequently, we find the individual variation more noticeable in the west, and the western type with lengthened face, shortened bi-zygomatic breadth, and increased stature somewhat different. But the change is a very gradual one from group to group, and the physical type, like the culture and language, dominated by the same essential traits throughout.

Judging from the indices, the relation of the Western Eskimo is closer to the Central than the Eastern Eskimo.

TABLE B

COMPARATIVE TABLE OF VARIATION OF INDICES OF EASTERN (LABRADOR AND GREENLAND), CENTRAL (SOUTHAMPTON ISLAND), AND WESTERN (ALASKAN) ESKIMO

Index	No. Skulls	Locality	Average	Divergence		Variation
				Above	Below	
Cephalic .....	20	Eastern	71.5	75.4	65.8	9.6
" .....	14	Central	74.55	78.2	68.6	9.6
" .....	21	Western	74.748	79.66	70.35	9.3
Vertical .....	9	Eastern	73.5	79.2	69.3	9.9
" .....	14	Central	74.3	79.2	66.2	13
" .....	21	Western	73.673	76.76	68.84	7.92
Orbital .....	8	Eastern	88.65	94.7	78.6	16.1
" .....	13	Central	90.87	105.4(?)	82.4	23
" .....	21	Western	89.98	99.50	83.95	15.55
Nasal .....	7	Eastern	45.55	50	40.3	9.7
" .....	13	Central	43.05	48.4	38.7	9.7
" .....	21	Western	41.072	48	33.93	15.07
Facial .....	6	Eastern	54.36	62.3	49.3	13
" .....	13	Central	52.65	54.9	46.1	8.8
" .....	21	Western	53.09	59.29	44.05	15.24
Gonio-zygomatic ..	7	Eastern	80.9	91.5	74.6	16.9
" ..	...	Central	...	...	...	...
" ..	21	Western	75.92	89.20	71.74	15.46
Palato maxillary...	7	Eastern	112.1	120	105.3	14.7
" .....	13	Central	119.4	127.3	106.7	20.6
" .....	18	Western	120.545	129.79	106.78	23.01
Horizontal circum. .	10	(Eastern)	513.5	550	476	74
" ..	14	Central	517	532	491	41
" ..	21	Western	507.8	540	487	53

*Note.*—The Central and Western measurements for horizontal circumference do not include the glabella. The palato-maxillary measurements are also external for both. Duckworth and Pain do not describe the Eastern measurement whether external or internal, for the palato-maxillary, or including glabella in the horizontal circumference. Measurements are all of adult crania. The Central measurements are taken from Hrdlička's Southampton island tables, and the Western from our Point Barrow series.

#### MEASUREMENTS IN DETAIL

*Form of the Skull.*—The detailed measurements of the crania of the Point Barrow Eskimo illustrate the general tendency of the

breadth of the head to keep constant in spite of a wide variation in length. The breadth averages of 137.3 for the males and 135.8 for the females may be compared with the corresponding length aver-

TABLE I.  
ESKIMO CRANIA FROM POINT BARROW, ALASKA  
*Measurements as to Form: Head Measurements*

Cat. No.	Sex	Length	Breadth	Bas. Height	Ceph. I.	Alt. I.	Ht. and Br. I.
5400	male	185	139	142	75.14	76.76	102.16
5401	"	196	140	143	71.43	72.96	102.14
5403	"	186	137	134	73.66	72.04	97.81
5406	"	189	137	134	72.49	70.90	97.81
5408	"	190	134	137	70.53	72.11	102.24
5409	"	181	131	131	72.92	72.92	100.00
5410	"	188	137	137	72.87	72.87	100.00
5411	"	185	135	137	72.97	74.05	101.48
5414	"	199	141	149	70.85	74.87	105.67
5415	"	191	137	141	71.73	73.82	102.92
5418	"	199	140	137	70.35	68.84	97.86
5423	"	187	137	141	73.20	75.40	102.92
5425	"	182	137	134	75.27	73.63	97.81
5426	"	190	141	144	73.68	74.21	102.13
Averages	....	189.1	137.3	138.6	72.65	73.24	100.68
5402	fem.	180	132	136	73.33	75.56	103.03
5405	"	181	136	130	75.14	71.82	95.59
5416	"	173	133	132	76.88	76.30	99.25
5420	"	182	137	136	75.27	74.57	99.27
5428	"	177	141	131	79.66	74.01	92.91
Averages	....	178.6	135.8	133	76.06	74.45	98.01
5404	adol.	173	131	133	75.72	76.88	101.53
5407	"	178	134	130	75.28	73.03	97.01
5413	"	175	132	127	75.43	72.57	96.21
5417	"	179	128	133	71.51	74.30	103.91
5421	"	176	130	126	73.86	71.59	97.67
5424	"	173	138	129	79.77	74.57	93.48
Averages	....	175.6	132.1	129.6	75.26	73.82	98.30
5412	inf.	166	127	122	76.51	73.49	96.06
5422	"	160	126	117	78.85	73.13	92.86
Averages	....	163	126.5	119.5	77.68	73.31	94.46

*Note.*—All measurements, unless otherwise indicated, are in millimeters. Length and breadth are maximum measurements. The height is the Basion-Bregma height.

ages of 189.1 and 178.2 respectively (see Table I.) The increase from the adolescent breadth average of 132.1 is slight relative to the

increase from the adolescent length average of 175.6. It will be noted here, as elsewhere, that the female approximates the adolescent type.

The well-known extreme length of head of the Eskimo is fully realized in this western group in the male series which attains an average of 189.1, which is as high as that of the purest central type (Southampton island, 189). There is considerable individual variation in the Point Barrow group, 182/196, which, however, is less than that of the central group, 179/204 for a smaller number. This phase has been dealt with by itself. It is not significant here, except to illustrate the fact, that with the supposedly purest groups of a racial type there is a large individual variation.

The average length of the female skulls in our series is much less, 178.6, and the range of individual variation smaller, 173/182; which, taken in conjunction with the above-mentioned tendency to constancy of breadth of head, places them well within the limits of mesocephalic skulls. It should be borne in mind, however, that this is a result of the lessening of the extreme length of head in the female sex and not a consequent broadening. As will be shown in later tables, the females have not acquired in proportion to the breadth of head, the extreme breadth of face characteristic of the males, while they have preserved other prominent traits, as the narrow nasal aperture, the broad palate, and deep set orbits.

The narrow-headedness of the Eskimo is well represented in the Point Barrow skulls. The average width, 137.3 for males and 136.8 for females, is less than that of the Southampton island Eskimo, 140 in males and 137 in females, but close to that of the Mackenzie Eskimo, 137 (Russell). There appears to be a tendency for the width of the head to decrease toward the west from the central region, which probably goes with a decrease of the width of face, until the broad-headed Aleutians are met with. Nevertheless, the racial tendency of the Eskimo toward a long, narrow head is as evident among the males in the west, as among the Eskimo generally in the east.

As might be expected from the extreme length, the cephalic index of the males, (72.65) shows a well-marked tendency toward



(dolichocephaly. Only two skulls in the series give averages above 75. The female skulls are more inclined to be mesocephalic, the average being 76.06. If we compare this figure with the adolescent average (75.26) we are again struck by the similarity of the female to the adolescent type. The infantile skulls give the high average of 77.68, owing to their lesser length. The breadth (126.5) remains remarkably close to the adult skulls.

In Table 2 a comparison has been made of the cranial indices of the various branches of Eskimo. It will be seen that the cephalic

TABLE 2.

COMPARATIVE TABLE OF CEPHALIC, ALTITUDINAL, AND HEIGHT-BREADTH INDICES OF ESKIMO GROUPS

Locality	No.	Sex	Collector	Cephalic	Altitud.	Height Breadth.
Eastern—						
E. Greenland.....	4	?	Papsch	72.9	74.2	101.70
W. Greenland.....	21	?	Bessels	72.6	73.7	101.05
Labrador.....	6	?	Duckworth	72.08	73.05 <sup>1</sup>	101.34
Central—						
Smith sound.....	99	?	Bessels	71.37 <sup>2</sup>	76.91	107.96
Southampton island .	9	male	Hrdlička	74.2	74.1	99.8
Southampton island .	5	fem.	Hrdlička	74.9	74.5	99.4
Mackenzie—						
Herschel island.....	9	?	Russell	74.6	73.5	98.76
Alaska—						
Point Barrow.....	16	male	Hawkes	72.65	73.24	100.68
Point Barrow.....	5	fem.	Hawkes	76.06	74.45	98.01
Bering strait.....	4	?	Army Med. Mus.	75.82	76.33	100.76
Aleutian.....	15	?	Bessels	86.49	74.02	86.05

index increases from the east to the west, while the altitudinal and height-breadth indices decrease. That is, the head becomes less elongated and scaphoid, and more rounding in the west. Unfortunately, we do not possess figures for the indices of the sexes over this entire area, but in the central region the female cephalic and altitudinal index is slightly higher than that of the male and in the Point Barrow skulls notably so. Two female skulls in the Bering strait group have cephalic indices of 75.14 and 78.57 as compared to the indices of 72.68 and 78.87 in the two male skulls. The shorter

<sup>1</sup> Four Greenland skulls were included in this index.

<sup>2</sup> Cephalic index for 100 skulls, other indices for 99.

head of the women in the west would tend to raise the index. Within the western group itself, Table 3 shows the gradual rise of the mean of the cephalic index from the Mackenzie river to the Aleutian islands. The approach appears to be toward the broad-headed Aleutian type rather than the Athapascan of the interior.

TABLE 3.

COMPARATIVE TABLE OF CEPHALIC INDICES OF WESTERN ESKIMO

Index	Herschel Island	Pt. Barrow	Bering St.	Aleutian Is.
70	...	3	...	...
71	...	3	...	...
72	I	4	...	...
73	I	5	I	...
74	3 <sup>1</sup>	...	...	...
75	2	7 <sup>1</sup>	I	...
76	2	2	I	...
77	...	...	...	...
78	...	2	I	I
79	..	2	...	...
80	...	...	...	...
81	...	...	..	...
82	...	...	...	2
83	...	...	...	...
84	.. <sup>10</sup> .	...	...	I
85	...	...	...	3 <sup>1</sup>
86	...	...	...	I
87	...	...	...	I
88	...	...	...	2
89	...	...	...	I
90	...	...	...	2
91	...	...	...	...
92	...	...	...	I
Total skulls.....	9	28	4	15
Average index.....	74.6	75.15	75.82	86.49

According to the measurements of A. J. Stone, the interior Alaskan Eskimo radically differ from the Athapascans, with whom they come in contact, in the form of the head, the length and breadth of the face, and the shape of the nose. The superior height of the Eskimo skull gives it a larger capacity than would be judged from

<sup>1</sup> Denotes mean measurements. Had it been possible to use the living measurements of A. J. Stone on the Nunatagmuit, an interior Eskimo tribe situated between Point Barrow and Bering strait, with an average cephalic index of 81, and a mean measurement of 82, the step between the Bering strait Eskimo and the Aleut would be nicely bridged. The difference between the cephalic index of the head and the skull, according to Boas, is 2.2 for the Eastern Eskimo.





POINT BARROW ESKIMO SKULLS: A, ADULT FEMALE, B, MALE, SHOWING RELATIVE DEVELOPMENT



POINT BARROW ESKIMO SKULLS: A, INFANTILE, B, ADOLESCENT, SHOWING RELATIVE DEVELOPMENT. INFANTILE SKULL IS ASYMMETRICAL







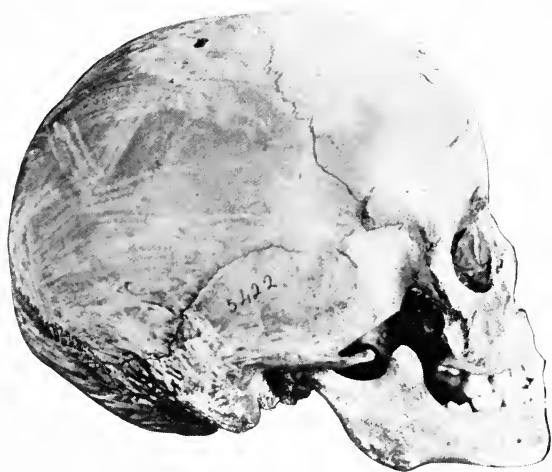
A



B

POINT BARROW ESKIMO SKULLS: A, FEMALE; B, MALE





A



B

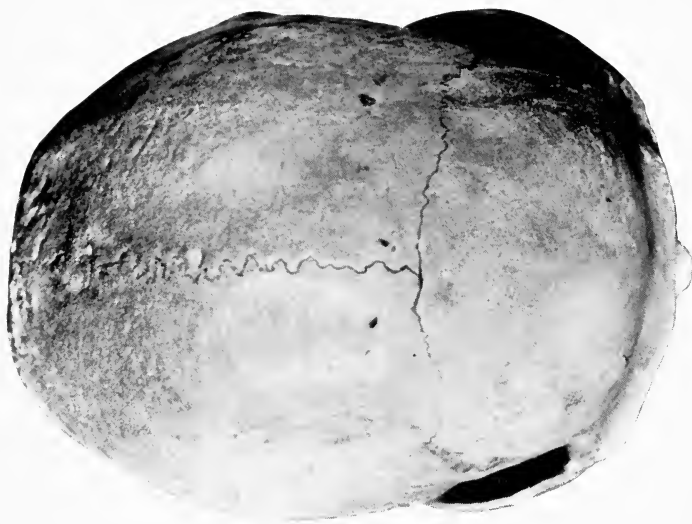
POINT BARROW ESKIMO SKULLS: A, INFANTILE; B, ADOLESCENT





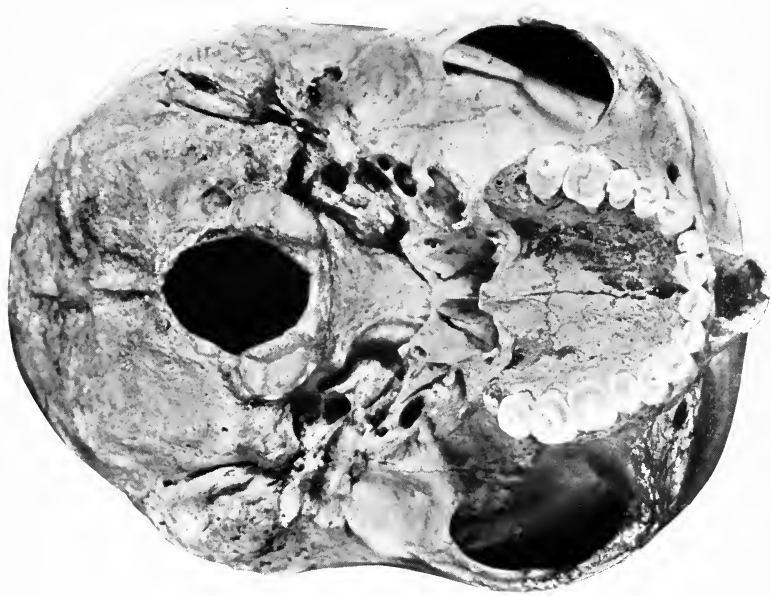


A



B

POINT BARROW ESKIMO SKULLS: A, ADULT FEMALE, B, ADULT MALE, SHOWING RELATIVE DEVELOPMENT



A



B

POINT BARROW ESKIMO SKULLS: BASAL VIEW, A, ADULT FEMALE, B, ADULT MALE, SHOWING BREADTH AND DEPTH OF PALATE AND OBLIQUE WEAR OF TEETH



its small frontal width. In fact, some heads are so scaphoid as to appear pathological. In spite of the extreme height of the Eskimo head, the altitudinal index is much diminished by the extreme length of the skull. Consequently, the Eskimo have a lower height index than the Lapps, who have a notably low skull, and who attain a higher degree on account of their shortness of head. The height breadth index gives a truer picture of the proportionate shape of the head, outside of length. Topinard suggested a combination of the height and height-breadth indices, an averaging of the results obtained by each, which would accord more nearly with the appearance of the crania.

In ten cases out of fourteen in the male series of the Point Barrow skulls the height exceeds the width. Among the Eastern Eskimo the proportion is greater, the general type having a width of 144 mm. and a height of 150 mm. The average width of the Point Barrow male skulls is 137.3 and the average height 138.7. The average height of the female crania shows a considerable decrease (133 mm.), whereas the width is nearly equal to that of the males (135.8).

The difference of the sexes in relation to height and breadth of skull is well brought out in the height-breadth indices. In this series there is only one female skull which does not fall under 100 (the width exceeding the height), and only four male skulls which do not give an index above 100 (the height exceeding the width). The four male skulls in which the breadth exceeds the height possess certain peculiarities in common which leads to the suspicion that they may represent an intruding strain of blood from another Eskimo district. They all possess a very high and well-marked temporal ridge, a high keel, a narrow forehead but a wide and bulging backhead. All four show a height-breadth index of 97, and in three the measurement for height and breadth is identical, 137 mm. and 134 mm.

*Capacity.*—In determining the capacity of the Point Barrow skulls an attempt was made to use the general formula of Dr. Lee<sup>1</sup> but it was found that the results did not agree with the actual measurements. The scaphocephalic shape of the Eskimo head,

<sup>1</sup> *Phil. Trans.*, 196, A, 1901.

which increases the height out of all proportion, rendered the formula useless. A special formula would probably have to be devised for the Eskimo.

TABLE 4

ESKIMO CRANIA FROM POINT BARROW, ALASKA  
*Measurements as to Capacity*

Cat. No.	Sex	Capacity	Circum.	Oph. Cir.	Nas. Opis. Arc.	Trans. Arc.
5400	male	1330 c.c.	530	510	375	315
5401	"	1610 "	545	535	383	317
5403	"	1410 "	520	510	365	305
5406	"	?	528	520	361	298
5408	"	1230 "	533	515	358	298
5409	"	?	520	495	362	302
5410	"	?	528	520	378	311
5411	"	?	520	510	352	293
5414	"	1510 "	553	540	395	325
5415	"	1480 "	533	520	380	303
5418	"	1410 "	557	540	377	310
5423	"	1480 "	535	515	370	307
5425	"	1250 "	515	505	357	303
5426	"	1550 "	530	522	372	318
Average	....	1426 "	532	517	370	307
5402	fem.	1300 "	510	500	361	303
5405	"	1200 "	507	502	360	295
5416	"	?	490	487	350	301
5420	"	1320 "	515	510	362	304
5428	"	1330 "	515	500	352	300
Average	....	1287.5 "	507.4	499.8	357	300.6
5404	adol.	1300 "	485	486	355	298
5407	"	1310 "	495	493	355	297
5413	"	1325 "	486	487	353	291
5417	"	1290 "	491	492	353	295
5421	"	1315 "	490	492	362	292
5424	"	1315 "	495	494	348	300
Average	....	1309.1 "	490.3	490.6	354.3	295.5
5412	inf.	1190 "	458	467	343	290
5422	"	1115 "	458	457	333	283
Average	....	1152.5 "	458	462	338	286.5

*Note.*—The figure for capacity is the average of three measurements taken on each skull, using no. 8 shot.

The circumferences are, respectively, horizontal, including and not including glabella. In the infantile and adolescent series, owing to the lack of development of the orbital ridges, the Orphryanic measurement slightly exceeds that in the inter-orbital ne. The transverse arc is measured from the upper margin of the auditory meatus.



The size of the skull was also found to be no exact criterion of the capacity, due to the large variation in the thickness of the parietal bones. One skull that appeared to be above the average in size gave a capacity of only 1230 c.c., while another skull of slightly less exterior measurement gave a capacity of 1330 c.c. The variation appears greatest in male skulls.

The capacity of the Point Barrow skulls as a whole is not as great as that of the Central and Eastern Eskimo. The average capacity of the male crania is 1426 c.c. as against 1563 c.c. for the Southampton island Eskimo (Hrdlička). The largest Point Barrow skull has a capacity of 1610 c.c., so it will be seen that the capacity is still large in the west, and that the head still maintains this distinctly Eskimo character. The female average in this group is about 1300 c.c., the general average being brought down to 1287 c.c. by one very small skull. The adolescent average of 1301.1 c.c. is instructive in showing the close correlation between the female and adolescent types, which is confirmed in other measurements.

The cause for the large capacity of the Eskimo skull still remains undiscovered. The superior inventiveness of this people is illustrated in their ingenious culture. The brain is said to show good differentiation, but no signs of extraordinary mental powers (Hrdlička). The diameter of the foramen magnum is large, indicating a stout spinal cord, which may or may not have a direct influence on the size of the brain. The large capacity of the infantile skulls, 1152.5 c.c., suggests that the large size of the brain is a racial trait, and not acquired through the educative process of their environment.

*Breadth of Face in Proportion to Breadth of Head.*—The Eskimo of the central region and Greenland are characterized by a very broad face in proportion to the breadth of head. The general proportion is 102, ranging as high as 105 and 107 in individuals. Eighty-five skulls from Smith sound, measured by Bessels, gave an average head width of 133 and an average facial (bi-zygomatic) width of 136, a proportion of 102. Unfortunately, in his long list of crania, Bessels made no distinctions as to sex, and this is an important difference, as may be observed in the following comparative table.

TABLE 5

COMPARATIVE TABLE OF THE PROPORTION BETWEEN BREADTH OF HEAD AND BREADTH OF FACE OF ESKIMO GROUPS

Locality	No. Skulls	Sex	Collector	Breadth Face	Breadth Head	Pro. BF/BH.
Greenland.....	5	male	Davis	147	140	105
Greenland.....	5	fem.	Davis	130	130	100
Smith sound.....	85	?	Bessels	133	130	102
West coast Baffin bay.....	5	male	Davis	137	135	102
West coast Baffin bay.....	2	fem.	Davis	124	132	94
Southampton island.....	9	male	Hrdlička	145	140	103.5
Southampton island.....	5	fem.	Hrdlička	138	137	100.7
Herschel island.....	9	?	Russell	139	137	101
Pt. Barrow.....	16	male	Hawkes	141.2	137.3	102.5
Pt. Barrow.....	5	fem.	Hawkes	132	136.2	96.8
Bering strait.....	2	male	Army Med. Mus.	134	136.5	98.12
Bering strait.....	2	fem.	Army Med. Mus.	130	131	99.24

*Living Measurements*

Locality	No. Heads	Sex	Collector	Breadth Face	Breadth Head	Pro. BF/BH.
Labrador.....	3	male	Virchow	147	149	99
Labrador.....	2	fem.	Virchow	134	137	98
Mackenzie (Kukpagnuit) .	12	male	Stone	147.8	144	102.7
Mackenzie (Kukpagnuit) .	6	fem.	Stone	139.7	141.5	99
Int. Alaska (Nunatagnuit).	12	male	Stone	155.7	154.5	100.8
Int. Alaska (Nunatagnuit).	5	fem.	Stone	144.6	142.6	101.6

In nearly all cases where a sex differentiation has been made, the male skulls show a proportion above 100 and the females below. In series where no such differentiation has been made, as in Bessels' Smith sound Eskimo and Russell's Mackenzie Eskimo, the general average is slightly over 100 (102 and 101), which may be considered as the average between the two sexes. But these figures are misleading, in that they fail to bring out the pronounced facial breadth in the male, and the lack of the same characteristic in the female. Consequently, owing to the small number of female skulls measured, and to their being lost sight of in the general average, the sex differentiation has been lost, and the extreme breadth of face emphasized as a racial trait, when it holds good only for the males. It will be remembered that a similar error was made in the case of the Tasmanians.

*Facial Indices.*—The upper facial portion of the Point Barrow

skulls is long, giving a relatively high index in spite of the extensive breadth of the face. The upper facial index (Kollmann's) of the male skulls is 52.48 (see Table 6). That of the female skulls is

TABLE 6

## ESKIMO CRANIA FROM POINT BARROW, ALASKA

*Measurements as to Form: Facial Measurements*

Cat. No.	Sex	Breadth Bi-zyg.	BF/BH Proportion	Height Chin. Nas.	Height Pros. Nas.	Facial Index	
						Total	Upper
5400	male	144	103.60	135	78	93.75	54.16
5401	"	144	102.86	134	72	93.06	50.00
5403	"	137	100.00	119	71	86.86	51.81
5406	"	138	100.73	?	79	?	57.29
5408	"	144	107.46	127	73	88.19	50.69
5409	"	133	100.76	?	67	?	50.76
5410	"	139	101.46	5	75	?	53.95
5411	"	139	101.46	?	73	?	52.52
5414	"	146	103.55	?	81	?	55.48
5415	"	141	102.92	?	74	?	52.46
5418	"	144	102.86	143	84	99.31	58.33
5423	"	143	104.38	131	76	91.61	52.45
5425	"	143	104.38	?	63	?	44.05
5426	"	144	100.00	?	73	?	50.69
Averages	.....	141	102.60	131.5	74.2	92.13	52.48
5402	fem.	135	102.27	?	72	?	53.33
5405	"	131	96.32	114	69	87.02	52.67
5416	"	129	96.99	?	62	?	48.06
5420	"	138	100.73	113	67	81.81	59.29
5428	"	137	97.16	123	70	89.78	56.91
Averages	.....	134	98.69	116	68	86.20	54.05
5404	adol.	115	87.79	?	62	?	53.91
5407	"	125	93.28	?	66	?	52.80
5413	"	111	84.09	105	62	94.59	53.86
5417	"	121	94.53	?	67	?	55.37
5421	"	114	87.69	111	62	97.37	54.39
5424	"	121	87.68	111	65	91.74	53.72
Averages	.....	117.8	89.17	109	64	94.56	54.01
5412	inf.	111	79.53	90	54	89.11	53.46
5422	"	102	80.95	89	50	87.25	49.02
Averages	.....	106.5	80.24	89.5	52	88.18	51.21

higher, 54.05, owing to the low bi-zygomatic width. The adolescent index is about the same as the female (54.01). Here again we find

the male producing a specialized form, while the female remains little differentiated from the adolescent.

The height of the lower jaw, except in one or two cases, is not as great as one would expect from the height of the upper part of the face. Consequently, the total facial index is rather low (92.12 for males and 86.20 for females), although higher than in other Eskimo groups. In skull 5418 the symphisial height of the mandible is 42 mm., the upper face is also much elongated, so that the total facial length nearly equals the bi-zygomatic breadth. This head is a good example of the extreme individual variations we occasionally find in the Western Eskimo, although the majority keep reasonably close to the racial type. The adolescent total facial index (94.56) is higher than that of the adults.

The upper facial index of the Point Barrow Eskimo does not differ much from that of the Southampton island Eskimo, as given by Hrdlička. Taking the average of the adult crania of both sexes, twenty-one Point Barrow skulls give an average index of 53.09 and 13 Southampton island skulls give 52.65. These averages again are close to the figures given for eastern crania by Duckworth and Pain. For six Labrador and Greenland skulls the average facial index was 54.36. This leads us to conclude that the upper facial index is another constant factor in the various Eskimo branches. But in comparing the total facial (gonio-zygomatic) index we find an increase in the west, due to the increase in total facial height in that quarter. Six male Point Barrow skulls have an average height from chin to nasion of 131.5 mm. as contrasted with six male Southampton island crania, which give a total facial length of 126 mm. (The number of male crania with mandibles happens in both groups to be the same.) Since the approximation between the head and skull measurements for facial indices has been found to be close, we may compare these measurements with those of Stone on living Alaskan natives, making allowance for a small variation (2.2, Boas, for Eastern Eskimo). Kukpagmuit (MacKenzie river Eskimo), males, facial height, 131.5 mm., which is the same as the skull measurement for the Point Barrow Eskimo males; Nunatagmuit (interior Alaskan Eskimo), 126.4 mm.;

Tahltan (northwest coast Indian), 129.2 mm.; Loucheux (interior Alaskan Indian), 122.9 mm.

The female measurements are Point Barrow (skull) 116 mm.; Kukpagmuit (head), 120.8 mm.; Nunatagmuit, 119.8 mm.; Tahltan, 118.7 mm.

*Nasal Index.*—Broca considered the nasal index one of the best for distinguishing the various races of mankind. It is particularly

TABLE 7

ESKIMO CRANIA FROM POINT BARROW, ALASKA  
*Measurements as to Form: Facial Measurements (Con.)*

Cat. No.	Sex	Nasal Height	Nasal Width	Nasal Index	Palatal Length	Palatal Width	Palatal Index
5400	male	57	23	40.35	56	70	125.00
5401	"	58	25	43.10	?	?	?
5403	"	56	23	41.07	50	63	118.87
5406	"	58	21	36.21	50	63	118.87
5408	"	57	25	43.86	51	62	121.57
5409	"	56	29	39.62	48	58	120.83
5410	"	56	19	33.93	51	56	109.80
5411	"	57	22	38.60	56	65	116.07
5414	"	59	26	44.07	56	70	125.00
5415	"	54	23	42.59	53	67	126.42
5418	"	62	25	40.32	59	63	106.78
5423	"	55	22	40.00	54	65	120.37
5425	"	52	25	48.08	53	59	111.32
5426	"	59	23	38.98	50	60	120.00
Averages	.....	56.6	23	40.69	53.1	62.7	118.31
5402	fem.	54	22	40.74	53	63	118.87
5405	"	55	24	43.64	50	59	118.00
5416	"	52	20	38.46	47	61	129.79
5420	"	50	24	48.00	49	60	122.45
5428	"	51	19	37.25	49	60	122.45
Averages	.....	52.4	21.8	41.62	49.6	60.6	122.78
5404	adol.	47	20	42.55	48	61	127.08
5407	"	51	20	39.22	48	60	125.00
5413	"	46	20	43.48	40	55	137.50
5417	"	53	22	41.51	49	61	124.49
5421	"	46	21	45.65	48	58	120.83
5424	"	49	21	42.86	48	62	129.17
Averages	.....	48.6	20.6	42.545	46.8	59.5	127.345
5412	inf.	40	17	42.50	37	50	135.13
5422	"	42	17	40.48	37	51	137.87
Averages	.....	41	17	41.49	37	50.5	136.50

valuable in the case of the Eskimo, in that it distinguishes them from the Mongolian type, whom they resemble in many other respects. The Eskimo are the most leptorrhine of known races, with a nasal index of 42.33 (Broca). The Point Barrow tribe have not lost this distinctly Eskimo trait. In fact, their nasal index is slightly lower than that of the Southampton island Eskimo. The Point Barrow male crania in our series have a nasal index of 40.69 and the female of 41.62 (see Table 7); the Southampton island skulls have a nasal index of 42.3 for males and 45.8 for females. The Labrador and Greenland skulls measured by Duckworth and Pain gave an average nasal index of 45.55. There is a larger individual variation in the western group than in the others (see Table of Variations<sup>1</sup>). One Point Barrow skull gives an index as low as 33.93. This does not mean necessarily that the Western Eskimo is a less pure type. The same causes which led to an increase of stature, a more certain and abundant food supply during the period of growth and improved conditions, may have also increased the variation in other characteristic racial traits. It will be noted that in the nasal index the females again are nearer the adolescent type. (Males 40.69; females 41.62; adolescents 42.54.)

*Orbital Index.*—The high value of the orbital index is another racial characteristic of the Eskimo, which it shares with the Indians of North America and the yellow race of Asia, in contradistinction to the low nasal index, which differentiates them from both. At the same time the Eskimo eye differs in appearance from the Mongolian.

The megasemic character of the Eskimo orbits in the adult is regarded by Duckworth and Pain as the retention of an infantile trait. This conclusion appears to be well borne out in the male skulls in the present series and in Hrdlička's measurements of the Southampton islanders. The index of the female skulls in the Point Barrow group falls slightly under megaseme (88.938) for the right and 88.156 for the left orbital index (see Table 8). The sexual variation of the orbital index is considerable, due largely to the greater development of the supra-orbital ridges in the male,

<sup>1</sup> Duckworth and Pain. *Contribution to Eskimo Craniology*, p. 129.

TABLE 8

ESKIMO CRANIA FROM POINT BARROW, ALASKA  
*Measurements as to Form: Facial Measurements (Con.)*

Cat. No.	Sex	Orbital Height		Orbital Width		Orbital Index	
		Right	Left	Right	Left	Right	Left
5400	male	37	38	43.5	43.5	85.06	87.36
5401	"	37	39	40.5	40.5	91.36	96.30
5403	"	37	37	41	41	90.24	90.24
5406	"	36	38	38	38.5	94.74	98.70
5408	"	38	38.5	41.2	44	92.23	87.50
5409	"	39	38	41	41	95.12	92.68
5410	"	38	37.5	40	40	95.00	93.75
5411	"	35.2	35.5	39.5	40	89.01	88.75
5414	"	36.5	37.5	43	41.5	84.88	90.30
5415	"	39	38	39.2	40	99.50	95.00
5418	"	37	37	40.2	43	92.03	86.05
5423	"	38.2	38.2	41.2	41.2	92.68	92.68
5425	"	37.5	37.5	41.5	44	90.36	85.23
5426	"	39.5	39.5	43	42.5	91.86	92.94
5864	"	37	38	42	42	88.10	90.48
Averages	.....	37.46	37.74	40.98	41.58	91.47	91.20
5402	fem.	39	37	41.5	41.5	93.98	89.16
5405	"	37	37	40	40	92.50	92.50
5416	"	34	34	40.5	40.5	83.95	83.95
5420	"	35	34.5	41	41	85.37	84.15
5428	"	36	35.5	40.5	39	88.89	91.02
Averages	.....	36.2	35.6	40.7	40.4	88.938	88.156
5404	adol.	34	34	39	39	87.18	87.18
5407	"	37	37	38	39.5	97.37	93.68
5413	"	37.5	36	36	35.8	104.17	100.55
5417	"	35.8	35.8	37	37	96.60	96.60
5421	"	35	35	36	36	97.22	97.22
5424	"	36.5	36.5	36.5	39	100.00	93.59
Averages	.....	35.96	35.71	37.08	37.71	97.09	94.80
5412	inf.	34	35	33	33	103.03	106.06
5422	"	33.5	34.5	35	33.5	96.72	103.03
Averages	.....	33.75	34.75	34	33.25	99.875	104.545

and the greater width of the male orbits. The orbits in the female skulls are rounder and less irregular than those in the male skulls. The proportion of height and breadth of the orbits is nearly equal in the adolescent crania, and the height exceeds the width in the infantile skulls. The depth of the orbits is remarkable in all the crania. The variation of the right and left orbits in individual skulls is noticeable, the difference being mainly in width.

*Palatal Index.*—The palate of the Point Barrow Eskimo is characterized by extreme breadth. In this racial feature they slightly exceed the Central Eskimo. The present series gives a palatal (external) index of 118.31 for males and 122.7 for females, and the Southampton island Eskimo 118.8 for males and 120 for females (Hrdlička). Within the Point Barrow series there is an occasional skull in which the palate is longer and narrower than the average. (Two male skulls give a palatal index of 106.78 and 109.80.) But the general tendency is to a very broad palate. The palate of the adolescent and infantile crania is relatively shorter than that of the adults, but partakes of the characteristic horseshoe shape.

*The Mandible.*—The mandible of the Eskimo is characterized by extreme bi-condylar width as is brought out in the mandibular

TABLE 9

ESKIMO CRANIA FROM POINT BARROW, ALASKA

*Measurements of Mandible*

Cat. No.	Sex	Condylar Symphyseal Length (A)	Bi-Condylar Width (B)	Mandibular Index (A/B)	Condylar Coronoid Width (C)	Coronoid Index (C/A)
5400	male	119	122	97.54	48	40.34
5401	"	125	123	101.63	50	40.65
5403	"	106	108	98.15	40	37.04
5408	"	130	122	106.56	50	38.46
5418	"	129	123	104.88	48	37.21
5423	"	121	126	96.03	48	39.66
5864 <sup>1</sup>	"	122	127	96.06	41	33.88
Averages	...	121.71	121.57	100.15	46.4	39.75
5405	fem.	102	114	89.47	40	39.22
5420	"	102	120	85.00	42	41.18
5428	"	113	118	95.76	42	37.17
Averages	...	105.6	117.3	90.476	41.3	39.19
5413	adol.	93	103	90.29	36	38.71
5421	"	102	98	104.08	38	40.86
5424	"	93	104	89.42	39	38.24
Averages	...	96	101.6	94.596	37.6	39.27
5412	inf.	79	90	87.78	30	37.97
5422	"	87	88	98.86	33	37.93
Averages	...	83	89	93.27	31.5	37.95

<sup>1</sup> Skull 5864 belongs to complete skeleton (see measurements of long bones).





A



B



C



D



E



F

POINT BARROW ESKIMO MANDIBLES: A, ADULT FEMALE, B, ADULT MALE, SHOWING EXTENSIVE EXOSTOSES FOR MUSCULAR ATTACHMENT AND STRENGTHENING OF THE ALVEOLAR PROCESS; C, INFANTILE; D, ADOLESCENT; E, ADULT FEMALE; F, ADULT MALE



TABLE 10

ESKIMO CRANIA FROM POINT BARROW, ALASKA

*Additional Measurements of Mandible*

Cat. No.	Sex	Bigon. Width (D)	Prop. (B/D)	Condyl Symphy Height	Symphy Height	Minimum Breadth Ascending Ramus	
						Right	Left
5400	male	116	95.08	63	36	44	45
5401	"	115	93.50	60	?	34	36
5403	"	98	90.74	49	27	39	38
5408	"	106	86.89	66	39	37	?
5418	"	112	91.06	63	42	42	40
5423	"	108	85.71	65	34	40	40
5864	"	113	88.98	65	34	38	37
Averages	.....	109.7	90.28	61.5	35.3	39.1	39.3
5404	fem.	97	85.09	58	30	37	38
5420	"	109	90.83	58	25(?)	34	33.
5428	"	97	82.20	59	35	36	36
Averages	.....	101	86.04	58.3	30	35.6	35.6
5413	adol.	84	81.55	49	25	33	33
5421	"	89	90.82	47	30	32.5	31
5424	"	101	97.12	52	29	33	32
Averages	.....	91.3	89.83	49.3	28	32.8	32
5412	inf.	78	86.67	41	23	25	26
5422	"	75	85.23	41	21	28	29
Averages	.....	76.5	85.95	41	22	26.5	27.5

index (see Tables 9 and 10). The ascending rami are broad and heavy and the coronoid processes low and stout. The extent of the condylo-coronoid width gives additional leverage to the temporal muscle. The surface roughenings for muscular attachment are very prominent (pl. xv), the area for the insertion of the masseter and pterygoid muscles being very extensive.

The extraordinary pressure to which the jaw is subjected has led to an accessory thickening in the alveolar process at the second molar. This occurs in the adolescent and infantile jaws as well as the adult, so it probably is an inherited trait. One of the male mandibles (fig. 26) exhibits a diseased condition, which has resulted in atrophy of the alveolar and coronoid processes and a shriveling of one side of the jaw. The skull is similarly affected at the base and

rendered asymmetrical by adjustment to the disproportionate position of the mandible.

*Dentition.*—Although the Eskimo mandible is exceedingly heavy and strong, the teeth are not unusually large (see dental index) (Table 11). They exhibit very primitive and at the same time cer-



FIG. 26. Side view of Point Barrow skull, showing obliquity of the angles of the mandible and slight asymmetry of the basal portion of the cranium, due to diseased condition of the bone.

tain advanced traits. The incisors meet edge to edge as in the apes, and the fifth tubercle is often present on the second lower molar; another simian characteristic. On the other hand, the true molars decrease in size from front to back, as in the higher races, and the third molar is more often suppressed or degenerate than in any other savage people (see Table 12). The canines do not overlap,

TABLE II

ESKIMO CRANIA FROM POINT BARROW, ALASKA

*Dentition*

Cat. No.	Sex	Dental Length	Basinasal Length	Dental Index'
5400	male	43	104	41.35
5406	"	43	101	42.57
5411	"	44	108	40.74
5414	"	38	108	35.19
5415	"	42	116	36.21
5418	"	46	105	43.81
5423	"	43	107	40.19
5425	"	36	107	34.64
5864	"	45	99	45.45
Averages	....	42.2	106.1	40.01
5402	fem.	41	102	40.20
5405	"	41	98	41.84
5416	"	39 (?)	101	38.61
5420	"	40	98	40.82
5428	"	38 (?)	97	39.18
Averages	....	39.8	99.2	40.13

as in the anthropoids and higher races of man, but meet edge to edge, and wear on a level with the incisors. The direction of the wear is oblique, being inward on the upper jaw, and outward on the lower. The inclination is due to the outer margins of the central lateral teeth of the lower jaw being brought into contact with the inner sides of the opposing teeth in the upper jaw during the grinding sideways movements of the mandible (Knowles). The extremely tough nature of the Eskimo food, much of which is eaten raw or dried, renders the rotary chewing process much more necessary than in other savage races that live almost entirely on fresh meat. The fondness of the Eskimo for chewing tough skin of the whale or mukluk (big seal), and the regular work of the women in chewing boot soles and skins, increases this tendency.

The crowns of all the teeth are heavy, even the canine approaching the premolar in shape. In the molars an additional tubercle is often present, and occasionally an accessory one. The third molar frequently takes on a foliated appearance, with additional small tubercles (see cuspid formulæ).

TABLE 12

ESKIMO CRANIA FROM POINT BARROW, ALASKA

*Dentition*

Cat. No.	Sex	Teeth		Cuspid Formulæ of Molars									
		Upper	Lower	Upper					Lower				
5400	male	16	16	right	4	?	3	left	4	4	3	right	4 4 4 left 4 4 4
5403*	"	?	14*	"	?	?	?	"	?	?	?	"	4 4 * " 4 4 *
5406†	"	14*	..	"	4	?	*	"	4	4	*	"	
5411†	"	16	..	"	?	?	?	"	4	4	3	"	
5414†	"	16	..	"	4	4	3	"	?	?	3	"	
5415†	"	14*	..	"	4	4	*	"	4	3	*	"	
5418	"	16	16	"	4	4	?	"	4	4	3	"	?
5423	"	15a	16	"	?	?	*	"	?	4	4	"	?
5425†	"	16	..	molars worn level									
5426†	"	16	..	molars missing									
5864	"	16	16	"	4	3	4	left	4	3	5	"	4 4 5c " 4 4 5b
5402†	fem.	16	..	"	4	?	?	"	4	3	?	"	
5405	"	16	14*	"	4	?	5c	"	4	3	5c	"	4 5 * " 4 5 *
5416†	"	15a	..	"	4	?	?	"	4	4	*	"	
5420	"	16	?	"	?	3	5c	"	?	?	?	"	?
5428	"	16	16	"	?	4	5	"	4	3	?	"	4 4 5 " 4 ? 5
5404†	adol.	14	..	"	4			"	4			"	
5407†	"	16d	..	"	4	4	5	"	4	4	?	"	
5413	"	14	14	"	4	4		"	4	4		"	4 5 " 4 5
5417†	"	16d	..	"	4	3	?	"	4	3	?	"	
5421	"	14	14	"	4	5		"	4	5		"	5 5 " 5 5
5424	"	14	14	"	4	3		"	4	3		"	5 5 " 5 5
5412	inf.	12e	12e	"	4	4		"	4	4		"	5 5 " 5 5
5424	"	12e	12e	"	5	4		"	5	4		"	5 5 " 5 5

\* Third molar missing.

† Lower jaw missing.

a Third molar missing on one side.

b Supernumary cusp on third molar.

c Crown foliated, presenting extra small cusps.

d Third molar visible, but not fully erupted.

e All teeth of first dentition, and first molars of second.

MEASUREMENTS OF OTHER SKELETAL PARTS THAN THE CRANIA  
IN THREE ESKIMO SKELETONS FROM POINT BARROW.

(RALPH LINTON)

*Sternum and Ribs.*—The sterna in both skeletons examined are asymmetrical, the supersternal notch being to the left of the median line. The pre-mesosternal suture slopes downward from left to right, whereas the supersternal notch slopes from right to left.

The asymmetry of the manubrium is indicated in the following measurements.

INFRA MARGIN OF THE CLAVICULAR FACET TO THE MESOSTERNAL SUTURE

5864 (male)		5429 (fem.)	
Right	Left	Right	Left
37.5	40	38	41

EDGE OF MESOSTERNAL SUTURE TO MIDDLE OF INTERCLAVICULAR NOTCH

Right	Left	Right	Left
48.5	45.2	49	47.2

TRANSVERSE DIAMETER OF THE CLAVICULAR FACETS

Right	Left	Right	Left
17	16	22.1	21

It will be seen from the above that asymmetry of the manubrium is proportional in both skeletons. The depression of the right side, however, appears to be confined to it. The levels of articulation with the ribs, the costal facets, are noticeably higher on the right side than on the left, not only as regards the upper facets, as is more usual (Thompson), but in the case of the lower as well.

The same causes which led to asymmetry of the manubrium have also led to a corresponding lengthening of the right first rib and clavicle. In both skeletons the right clavicle is four mm. longer than the left, and the first rib from one to five mm. longer on the right than the left. The contraction of the left side has resulted in a thickening of the bones and an increase of their curve with a corresponding diminution of the curve in those on the right side.<sup>1</sup>

<sup>1</sup> The depression of the right shoulder, and resultant changes already noted are not confined to any one race. It has been noted in the white race and is said to be caused by carrying heavy objects on the right shoulder, or more particularly in the right hand. The heavy harpoon and dog whip which the Eskimo are accustomed to carry in the right hand, as well as the more extended use of the same, may have caused an exaggeration of this tendency.

A curious anomaly is the existence of a thirteenth rib in connection with an additional thoracic vertebra in 5864. It may have been present in 5429 also, as this skeleton had the additional vertebra, but is now incomplete.

The thirteenth rib occurs on both sides, the length being 89 mm. for the right and 87.5 for the left. They are roughened for muscular attachment and the articular facets are large and well developed. In shape, and the arrangement of bony protuberances, they agree with the twelfth rib of normal individuals. In both 5864 and 5429 the twelfth rib is abnormally long (in 5864 156 mm. for the right and 152 mm. for the left) and its tip deeply pitted for the attachment of cartilage.

In 5864 ossification has not yet taken place between the first and second parts of the mesosternum, nor between it and the manubrium, but is complete between the second and third part of the mesosternum, indicating that the skeleton is that of a young adult. In 5429 ossification is complete in the mesosternum and partial between the mesosternum and manubrium, indicating an advanced age. In 5864 the xiphisternum is ossified, but is not yet attached to the body of the sternum. 5429 is much broader, heavier, and thicker than 5864, as the following measurements show.

STERNUM, NOT INCLUDING XIPHISTERNUM

<i>Total Length (Median Line)</i>			
5864			158
5429			155
<i>Manubrium</i>			
	Max. Length	Max. Width	Max. Thickness
5864	39.5	63.5	12
5429	43	63.5	15
<i>Mesosternum</i>			
5864	116.5	38	11
5429	112	45	13

*Vertebræ*.—In the case of the vertebræ there are only two spines available for study. The vertebræ of both are well developed as to strength. In 5429 there are marginal exostoses, and the laminae and spinous process of the fifth lumbar vertebra are separate, articulating with the proximal part of the arch. The same anomaly has been noted in the fourth and fifth lumbar vertebræ of a specimen from Smith sound described by Dr. Hrdlička. In addition the lateral spine on the right side of the second lumbar vertebra is separate, and there is a facet present for its articulation. The thirteenth thoracic vertebra is present in both specimens; and has been described at length elsewhere (see Occurrence of an Extra Vertebra in the Eskimo). Except for this peculiarity 5864 is normal in every way.

The indices of the five lumbar vertebræ (taken according to Cunningham) are as follows:—



Cat. No.	5429	5864
Sex	fem.(?)	male
1	118.18	120
2	106.25	107.69
3	108.70	96.43
4	91.67	91.08
5	82	85.71
Lumbo-vertebral index...	100.84	99.6

The later of these two indices differs by only .1 from that given by Cunningham as the average for the Eskimo. In respect to the lumbar curve, the Eskimo occupies a position about midway between the European and the primitive peoples, such as the Australians, Bushmen, etc. The environmental factors which might lead to this have already been dealt with (see Occurrence of an Extra Vertebra in the Eskimo).

*Innominate Bone.*—The innominate bones are strong and well developed, but in no way depart from normal. The measurements are as follows:—

Cat. No.	5864		5863	5429
Sex.....	male		fem.	fem.(?)
	right	left	left	right
Height (max.).....	238	235	205	206
Breadth (max.).....	171	170	150	160
Index.....	71.85	72.34	73.17	77.67

*Sacrum.*—The anterior curve of the sacrum is slight, and begins at the body of the second segment. The wall of the spinal canal is deficient from the beginning of the fourth segment. The normal five segments are present, and there is no indication that the first sacral vertebra has become detached to form a sixth lumbar at the same time that the first coccygeal has become ossified to the sacrum, as was the case in the two spines containing an additional vertebra described by Lane.<sup>1</sup>

Cat. No.	Sex	Height (max.)	Breadth (max.)	Index
5864	male	124	120	96.77

*Scapula.*—The scapulæ are remarkable for their length and narrowness, corresponding closely to those from Smith sound described by Hrdlička.

<sup>1</sup> W. Arbutnot Lane, "Some Variations in the Human Skeleton," *Journal of Anatomy and Physiology*, Vol. 20, Third Part, April, 1886.

The scapular and infrascapular indices corresponded fairly well with those given by Flower.<sup>1</sup> These indices form a marked exception to the primitive traits usually found in Eskimo skeletons, for they are at the other extreme from those of the anthropoids, while the indices of Europeans occupy a position about midway between.

The right glenoid fossa of 5864 is larger than the left, the dimensions being 42x28.2 and 42x27.1, respectively.

In all the scapulæ examined, the superior border forms a deep, almost U-shaped notch, the characteristic being most exaggerated in 5864 and least so in 5429, in which the suprascapular notch is well marked. This concavity of the superior border of the scapula appears to be a racial characteristic, being more or less common throughout all the Eskimo groups. It rarely occurs in whites or Indians. The scapulæ of a gorilla in the Wistar Institute collection shows this same concavity, the resemblance being striking. On the other hand, it did not occur in any of eight orang utan skeletons examined. The cause of this anomaly is not evident in the culture of the Eskimo, and it may well be an inherited evolutionary trait.

*Clavicle.*—Special mention has been made elsewhere of the lengthening and strengthening of the clavicle on the right side in connection with asymmetry of the first rib. The bones are otherwise normal, being fairly strong, with roughenings for muscular attachment well, but not excessively developed.

Cat. No.	5864 (Male)		5429 (Fem.?)	
	Right	Left	Right	Left
Length.....	168	164	144	140

*Humerus.*—The humeri of 5863 were both perforated in the olecranon fossa, the openings being of fair size, and the left larger than the right. This seems to be a primitive, although scarcely simian characteristic, being of more frequent occurrence in the anthropoids than in man, and in the ancient than the modern races. Even in the anthropoids it is an individual variation. Its most frequent occurrence among human beings is in prehistoric

<sup>1</sup> W. H. Flower and Dr. J. G. Garson, "Scapular Index as a Race Character in Man," *Journal of Anatomy and Physiology*, Vol. 14, Part 1, October, 1879.

Indian skeletons from Arizona, in one collection of which no less than 54 per cent. had one or both humeri perforated.<sup>1</sup> It is not common in any living race, but occurs oftener among primitive peoples than it does among Europeans.

In 5863 the exostoses for the attachment of muscles are well developed.

Cat. No.	5864 (Male)		5863 (Fem.)	
	Right	Left	Right	Left
Max. length.....			297	293
Ant. post. diam. at middle.....	27	26	19	19
Lateral diam. at middle.....	19	19	14	14
Index at middle.....		73.08	73.68	73.68
Humero femoral index.....	68.85	67.28	73.69	72.70

*Radius.*—The radii are strongly built, but perfectly normal. The radio-humeral index agreed fairly well with that given by Hrdlička, although the absolute measurements were somewhat greater.

#### RADIUS (MEASUREMENTS)

Cat. No.	5864 (Male)		5863 (Fem.)
	Right	Left	Right
Max. length .....	252	247	213
Radio-humeral index.....	75.00	75.07	71.71

#### ULNA

Cat. No.	5864 (Male)		5863 (Fem.)
	Right	Left	Right
Max. length.....	270	271	233

*Femur.*—In 5864 the femora are powerfully built, and exceed in length the average for both whites and Indians. The longest femur among the specimens from Smith sound described by Hrdlička was 467, while the average for males was 380.9, as opposed to 489 in this specimen. 5863 also exceeds either of the adult females described by him, being 403, as opposed to 386 for the larger of his specimens, which he expressly states was fairly tall for an individual from the eastern group. This length is the more remarkable in that the femora in question (5863) have an excessive forward curve, and very heavy shaft. The entire surface of the bone is slightly roughened, and the gluteal ridge and linea aspera are excessively developed, giving the specimens a disproportionate anterior posterior diameter at the middle. The whole appearance of the bone is very primitive.

<sup>1</sup> Dr. D. S. Lamb, "The Olecranon Perforation," *American Anthropologist*, Vol. III., 1890.

Cat. No.	5864 (Male)		5863 (Fem.)	
	Right	Left	Right	Left
Max. length.....	488	489	403	403
Ant. post. diam. at middle (A).....	32	32	31	30
Lat. diam. at middle (B).....	30	29	24	23
Index (B/A).....	93.75	90.63	77.42	76.67
Min. ant. post diam. at greatest expanse of				
upper flattening (C).....	30	29	24	23
Min. lateral diam. at upper flattening (A) .	36	35.5	29	28
Index of flattening (C/D).....	83.33	81.67	82.75	82.07

*Tibia.*—The tibiæ in both cases are quite normal, although in 5863 the oblique line is strongly developed and the entire surface slightly roughened, as in the femora of this specimen. The length of the tibiæ of 5864 is somewhat above the average for white males, although that of 5863 is slightly below the figures given for white females. In the former the right tibia is 8 mm. longer than the left. The tibio-femoral index was above 84, thus showing a greater proportional length of tibia than in the Smith sound group, or even whites. The anterior posterior diameters were also found to be somewhat greater than for whites of corresponding sexes. This shows a considerable variation from the Smith sound group, in which they were less. On the whole, it seems that the Alaskan Eskimo have much longer and stronger legs than their eastern relatives, a difference which can be easily accounted for by their habit of taking long hunting expeditions on foot, and by their use of the roomy umiak instead of the kayak, which cramps the legs. A more certain and plentiful supply of food during the period of growth may also be an important factor in insuring a good development of the long bones.

## TIBIA (MEASUREMENTS)

Cat. No.	5864 (Male)		5863 (Fem.)	
	Right	Left	Right	Left
Max. length.....	415	407	341	341
Ant. post. diam. at middle (A).....	32	31	27	28
Lat. diam. at middle (B).....	24	22.5	17.5	18
Index (B/A).....	75.00	72.58	62.11	64.29
Tibio-femoral index.....	85.04	83.39	84.61	84.61
Max. ant. post. diam. at nutritive foramen (C).....	35	34	28.5	29
Max. lat. diam. at nutritive foramen (D) .	27.5	25.5	19	18
Index (D/C).....	78.57	75.00	66.66	62.07

*Fibula*.—The fibulæ are well developed. In both cases they are slightly longer on the left than on the right side, thus disagreeing with Hrdlička's observations, according to which the bone was longer on the right.

Cat. No.	5864 (Male)	5863 (Fem.)
Max. length.....	399      403	326      327

## PATELLÆ

Cat. No.	5864 (Male)	
	Right	Left
Length.....	46	45.5
Breadth.....	49	48
Thickness.....	20	21

## OS CALCIS

Cat. No.	5864 (Male)	
	Right	Left
Height at middle between eleva-		
tions.....	45.5	44
Breadth at middle minimum.....	29	28
No. of facets for the astragalus....	3	3

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